Remarks

This Amendment is being filed together with a "Request for Continued Examination (RCE) Transmittal", as a submission pursuant to 37 C.F.R. §1.114(c), and reconsideration of this Patent Application is respectfully requested.

The Office Action mailed October 17, 2008, objects to identified claims for containing language which is considered to be informal. Claims 14 to 25 have additionally been rejected under 35 U.S.C. §112, second paragraph, because claim 14 is considered to contain indefinite language. The undersigned would like to thank the Examiner for the suggestions made for improving the language of the claims and the claims have been amended, as suggested in the Office Action, to remove informal language.

In particular, claim 13 has been amended to better differentiate the "elementary strata" defined by the claimed "computer-aided design" from the "manufactured strata" which are combined to reconstruct the part and the fluid transport circuit. Corresponding amendments have also been made to claims 14 to 17, 20 and 23.

Claims 13 and 14 have been amended to remove the recitation of a "break-down associated with the part", leaving only the recitations of a "break-down of the part", to more consistently recite this element. Claim 14 has also been

amended to replace the previous recitation of a "breaking-down" with the phrase "breaking down" (without the hyphen) to provide a more consistent recitation of this element, as well.

Claim 14 has also been amended to delete the term "additional", for consistency and to provide later recitations of the "isolating circuit" with appropriate antecedent basis. A corresponding amendment has also been made to claim 20. The amendments made to claims 14 and 20 will leave moot the need to amend dependent claims 21 and 22, which already appropriately recite the "isolating circuit".

Claim 15 has also been amended to appropriately correct the recited dependency to "13 or 14", to reflect the cancellation of claims 1 and 2, and claim 24 has been amended to replace the term "the group" with the term "a group".

It is submitted that the foregoing amendments overcome the objections made to the claims, as well as the rejection of claims 14 to 25 under 35 U.S.C. §112, second paragraph.

Claim 16 has additionally been amended to delete the alternative recitation "or copy". Claim 20 has additionally been amended to recite "isolating chambers" to provide later recitations of the "isolating chambers" with appropriate antecedent basis. Claim 21 has additionally been amended to recite "follower channels" to better correspond to description in the original specification for this Patent Application, for example, at lines 23 and 24 of page 13. Claims 26 to 35 have

been newly presented to claim additional elements of applicant's method.

It is submitted that the foregoing amendments operate to place the claims of this Patent Application in condition for allowance. In the event that any further issues are identified which may require further consideration, the Examiner is invited to telephone the undersigned to discuss and resolve such issues.

It is further submitted that the clarification provided by the above-discussed amendments also operates to more clearly identify the significant and patentable distinctions present in applicants' claims.

Claims 13 to 25 are rejected under 35 U.S.C. §103(a) as being unpatentable over a proposed combination of an article authored by Choi et al. with U.S. Patent No. 5,775,402 (Sachs et al.). As the Examiner correctly notes, Choi et al. disclose various methods for performing the computer-aided manufacture of structures from laminated sheets, including the method of "Stratoconception" that was identified in the specification for this Patent Application (e.g., at line 10 of page 4 of the original specification), and the disclosed methods have certain features in common with elements recited in applicants' claims. However, as is further correctly noted by the Examiner, in the paragraph presented at the middle of page 6 of the Office Action, there are also significant differences between applicants' claims and the disclosure of Choi et al.

Sachs et al. has been cited as a disclosure of the various elements recited in applicants' claims which are absent from the disclosure of Choi et al. It is submitted, however, that with the above-discussed clarification of the language of applicants' claims, it becomes clear that Sachs et al. do not, in fact, disclose the subject matter which is recited in applicants' claims, and reconsideration of the patentability of applicants' claims is respectfully requested in view of the following.

Sachs et al. disclose the manufacture of a mold using a process which is best summarized from line 49 of column 3 to line 14 of column 4 (in the "Background of the Invention") and from line 36 of column 6 to line 30 of column 7 (in the "Detailed Description of the Invention"). To this end, "a powder material is deposited in layers, and a polymer or inorganic binder is selectively printed on each layer" (col. 6, lines 38 to 40) to "bind the powder within the layer and between layers" (col. 3, lines 59 and 60; emphasis added). Noting lines 46 to 51 of column 6, it is only after the completion of this phase of the process that steps are taken to sinter the previously deposited layers of material to cure the polymer material and fix the mold being constructed. Moreover, and after the layers have been deposited and bound together, but before the deposited layers have been sintered to form the mold being constructed, steps must be taken to remove unbound powder from the mold (e.g., noting lines 45 to 50 of column 6).

This is to be distinguished from applicants' claimed method for producing mechanical parts, wherein strata including the predefined elementary chambers are manufactured, and the manufactured strata are superposed and assembled to completely reconstruct the part and the fluid transport circuit. Resulting from this, the elementary chambers are fixed in the manufactured strata during manufacture of the strata, and not during assembly of the manufactured strata, as in Sachs et al. Moreover, this eliminates the need to remove unbound material from the bound layers of Sachs et al. (which would include the powder bound within the layers and between the layers), and the disadvantages associated with removal of the unbound material.

For example, it will in practice be difficult to extract the compacted powder from within and between the layers, and to empty the powder from the channels, so the "green part" can then be sintered. Recognizing this, Sachs et al. disclose techniques for accomplishing removal of the powder, at lines 17 to 30 of column 7, including "vibration of the green mold, which is sufficient to flow the unbound powder out of the channels", followed by removal of the unbound powder by "blowing with air or vibration", and "to immerse the printed component in water charged with CO_2 (soda water) within a vessel capable of sustaining a vacuum", whereupon the "pressure is then rapidly dropped through the use of a vacuum pump and vacuum reservoir, thereby causing the CO_2 to come out of solution" to form bubbles

which "eject the loose powder from the channels".

Such steps, however, are performed prior to sintering, at a stage of the process during which the part is still fragile, and when there is great risk of breakage and deterioration of the part. Moreover, the part obtained at the end of such a process will be made up of material having mechanical performance which is insufficient to allow optimum connection of the channels and of the surfaces, as distinguished from applicants' method, which allows the part to be manufactured from steel, including 40 CMD8 or even Z38CDV5 steels, which are preferred for the realization of tools and production molds. This also makes it possible to decrease the distances between the channels and the mold surface, which in turn allows parts produced in accordance with applicant's claims to have optimized thicknesses and optimized reduction in the size of the channels (and/or its layers) and the surface. There is also a risk that the removal of unbound material which is required for producing the part using the process described by Sachs et al. will not even be possible for channels having a particularly complex form.

Consequently, applicants' claims are seen to be directed to a method, and the parts formed by such a method, which are significantly and patentably different from the process and the parts formed by the process of Sachs et al. Applicants' claims are further directed to the following distinguishing features, as well.

For example, claim 14 is directed to providing the manufactured part with an isolating circuit which is coupled with the fluid transport circuit. This is accomplished by steps which parallel the steps used to produce the fluid transport circuit, and as such, which similarly distinguish the process disclosed by Sachs et al.

Claim 15 is directed to the manufactured part which is produced by the method of claim 13 or claim 14, and includes a fluid transport circuit which is completely reconstructed during assembly of the manufactured strata, including placement of the elementary chambers of the manufactured strata in fluid-tight communication to reconstruct the fluid transport circuit. This is to be distinguished from the molds produced by the process disclosed by Sachs et al., having channels which are shaped during assembly of the layers, rather than by an assembly of previously manufactured strata. Claim 26 has been newly added to present a method claim directed to this distinguishing feature.

Claims 16 and 17, as well as newly added claims 27 to 29, are further directed to the fluid transport circuit which is developed following reconstruction of the manufactured strata, including a fluid transport circuit which is capable of forming the three-dimensional network of channels shown in Figure 1 of the drawings (claims 16 and 28) and the layer-shaped chamber shown in Figure 5 of the drawings (claims 17 and 29). The

specification has been correspondingly amended, from line 2 to line 9 of page 9 of the substitute specification submitted with the Reply which was filed in this matter on July 8, 2008, to expressly describe the three-dimensional network of regulating channels (2) originally shown in Figure 1. Additional support for this amendment is provided in the original specification for this Patent Application, from line 11 to line 13 of page 15.

It is submitted that the person of ordinary skill in the art at the time the present invention was made would not have referred to the disclosure of Sachs et al. to produce a fluid transport circuit formed as a three-dimensional network or a layer-shaped chamber because of the risks resulting from the fragile condition of the green part during formation of the layers, prior to sintering, and the need to remove unbound material from the part prior to sintering. This could lead to the risk of a collapse of the complex channels being produced, especially for the production of a layer-shaped chamber having limited portions capable of providing support for the chamber being produced.

Further to be noted is that in order to increase "the effective heat transfer surface area for a cooling channel" (col. 10, lines 60 and 61), Sachs et al. provide the cooling channel with the shaped geometries 11, 12 shown in Figures 6 and 7, or the thermal regions 18 shown in Figure 8. In accordance with the present invention, effective heat transfer is achieved with

a fluid transport circuit formed as a three-dimensional network or as a layer-shaped chamber, so that the part always has an optimized thickness between the channels or the chamber and the surface of the part.

Claims 20 to 22, as well as newly added claims 32 to 35, are further directed to the isolating circuit which is developed following reconstruction of the manufactured strata, including an isolating circuit which is capable of forming a three-dimensional network of channels and an isolating circuit which is formed as a layer-shaped chamber. Support for these features is provided in the original specification for this Patent Application, from line 18 to line 29 of page 13, with reference to Figures 11 and 12 of the originally submitted drawings.

It is submitted that the person of ordinary skill in the art at the time the present invention was made would not have referred to the disclosure of Sachs et al. to produce an isolating circuit formed as a three-dimensional network or a layer-shaped chamber because of the risks resulting from the fragile condition of the green part during formation of the layers, prior to sintering, and the need to remove unbound material from the part prior to sintering, which could once again lead to the risk of a collapse of the complex channels being produced, especially for the production of a layer-shaped chamber having limited portions capable of providing support for

the chamber being produced.

In addition to the measures disclosed by Sachs et al. for increasing the effective heat transfer surface area of the cooling channel, Sachs et al. further disclose measures for accommodating other problems conventionally encountered in such processes, including excessive thermal inertia of the molds and the uncontrollable influence of external conditions on regulation of the manufactured molds. To this end, Sachs et al. "back the mold surfaces 21 and conformal cooling channels 22 with a cellular structure" (col. 12, lines 56 to 58), i.e., the cellular structure 23 shown in Figure 9. In accordance with the present invention, the molding surface and the fluid transport circuit are "backed" with an isolating circuit in the form of a three-dimensional network of channels or a layer-shaped chamber, which can be filled by an insulating material, by air, or by a suitable heat transfer fluid.

It is submitted that the person of ordinary skill in the art at the time the present invention was made would not have referred to the disclosure of Sachs et al. to develop applicants' measures for accommodating conventionally encountered problems such as excessive thermal inertia and uncontrollable influence of external conditions on regulation of the manufactured molds because the disclosed cellular cooling channels 23 require the removal of unbound powder from the green part prior to sintering (col. 13, lines 23 to 28), again leading to the risks resulting

from the fragile condition of the green part during formation of the layers, prior to sintering, and the need to remove unbound material from the part prior to sintering, which could again lead to the risk of a collapse of the complex channels being produced. In accordance with the present invention, these conventionally encountered problems are accommodated with an isolating circuit formed as a three-dimensional network or as a layer-shaped chamber, so that the part always has an optimized thickness between the isolating channels or chamber and the remainder of the part.

Claims 30 and 31 are directed to production of the manufactured strata, reciting formation of the elementary chambers in surface portions of the manufactured strata, to a depth less than the defined thickness of the manufactured strata, and combination of the elementary chambers with the surface portions of adjacent manufactured strata to form the fluid transport circuit. Support for these features is provided in the original specification for this Patent Application, from line 30 of page 10 to line 11 of page 11. Once again, these features are not disclosed by Sachs et al., and are structurally inconsistent with the process which is disclosed by Sachs et al.

It is, therefore, submitted that applicants' claims 13 to 35 are not subject to rejection under 35 U.S.C. §103(a) based on the disclosures of Choi et al. and Sachs et al., and

that applicants' claims are in condition for allowance.

Entry of the present Amendment, and a favorable consideration of this Patent Application in view of the foregoing, is respectfully requested.

Respectfully submitted,

GARY M. COHEN, ESQ.
Reg. No. 28,834
Attorney for Applicants
Tel.: (610) 975-4430

I hereby certify that this correspondence is being facsimile transmitted to the United States Patent and Trademark Office (Fax No. 571-273-8300) on: April 16, 2009.

Date: 4/16/09 Gary M. Cohen, Esq.